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GAS ABSTRACTS

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1. GAS INDUSTRY

Gas Industry in 1950

Hulcy, D. A. GAS INDUSTRY ESTABLISHES NEW RECORDS IN 1950. *Gas Age* **107**, 19-23, 69-72 (1951) *January* 4.

The progress of the gas industry during 1950 is reviewed. Statistics are given for sales, revenues and consumers. It is shown that the industry has doubled in value from a 5 billion dollar industry in 1945 to a 10 billion dollar industry in 1950.

J. D. Parent

Gas Prices

Ralph, H. D. MINIMUM GAS PRICES. *Oil Gas J.* **49**, 36-37 (1950) *December* 28.

The U.S. Supreme Court recently upheld the validity of the order of the Oklahoma Corporation Commission placing a minimum well head price on the gas from the Guymon-Hugoton field. The validity of a similar order in Kansas is now before the court and is expected to be upheld. Extension of such minimum prices to other fields and states is expected. The court has decided that it is reasonable to have a minimum price so as to prevent economic and physical waste. It is only a matter of conjecture as to the attitude of the FPC on establishment of field prices by state authorities.

J. D. Parent

LP-Gas

Kreutzer, A. C. ALL THAT VAPORIZES IS NOT "GAS". *Public Utilities Fortnightly* **47**, 69-77 (1951) *January* 18.

This is a brief story of the use of LPG. The major purpose of the article is to show that the distributors of LPG should not be classed with public utilities and so be subjected to governmental regulation.

J. D. Parent

Rugh, K. W. and Benz, G. R. L.P.G. GROWTH: INDUSTRY REGISTERS BIG INCREASE IN SALES PERCENTAGE OVER 1949; FUTURE GROWTH DEPENDS ON DEFENSE PROGRAM. *Oil Gas J.* **49**, 28-29 (1951) *January* 4.

Total sales of L.P.G. in 1950 increased 25.4 per cent over 1949, in contrast with a 1949 gain of 5.9 per cent over 1948. Domestic use increased 31.7 per cent over 1949. Total consumed was 2,143,000,000 gal. L.P.G. is now used in 7,500,000 homes and farms not on gas mains. Industrial uses gained 21.4 per cent. L.P.G. used as a base material for manufacture of chemicals registered a 19.3 per cent jump over 1949. Big increase in consumer interest was noted in L.P.G. as fuel for internal combustion engines.

Authors' abstract

Manufactured Gas

Mitchell, G. F. IMPORTANCE OF MANUFACTURED GAS IN GAS INDUSTRY ECONOMY. *Gas Age* **107**, 25, 63 (1951) *January* 4.

At the end of 1950 there were about 7½ million customers for straight manufactured gas and 2.1 million customers for mixed gas, so that more than 400 billion cu ft was manufactured for this service. Many important gas utilities which have changed over to natural or mixed gas have maintained their manufactured gas plants as standby equipment for peak load demands: Metropolitan New York and 8 Eastern Seaboard States will be served after the turn of the year with 500 million CFD by the 1840 mile pipeline of the Transcontinental Gas Pipe Line Corp. This gas will be used as one of the materials for manufacturing gas for New York. New England will continue for some time to use manufactured gas, utilizing modern oil-gas making processes developed under the gas industry research program. Problems of peak load production and interchangeability of manufactured and natural gas continue to receive major attention.

O. P. Brysch

Natural Gas

Bennett, C. E. NATURAL GAS: A LOOK BACK AND AHEAD. *Gas Age* **107**, 26, 66-68 (1951) *January* 4.

The progress of the natural gas industry during the past year is reviewed. Natural gas is now supplying 20% of the total energy of the country. A total of 5.9 trillion cu ft was produced. Included in the paper is a review of some important court decisions such as the East Ohio case and the upholding of the right of

the Oklahoma Corporation Commission to fix minimum wellhead prices. The rescinding of FPC order No. 139 is viewed as a possible first step toward FPC control right back to the well head.

J. D. Parent

2. APPLIANCES

Air Conditioning

Whitlow, E. P. and McNeely, L. A. ABSORPTION AIR CONDITIONING. *Refrig. Eng.* **59,** 38-43, 100-101 (1951) *January.*

The problems of expanding the absorption refrigeration principle to a 20 ton unit are described. Complete outline of steps for design are described.

D. L. Nicol

Burners

Norman, E. A., Jr. (assigned to Norman Products Co.) FLAME RETENTION HEAD FOR GAS BURNERS. U.S. 2,537,542 (1951) January 9.

A flame retention head is described for single port gas burners operating at a low static back pressure. The device entraps a portion of fuel at the burner head and maintains pilot combustion at the perimeter of the burner head to prevent blow off and lifting.

D. L. Nicol

Russell, S. A. ELECTROMAGNETIC IGNITION APPARATUS FOR FUEL GAS. U.S. 2,536,468 (1951) January 2.

A device to generate an electrical potential for spark ignition of fuel gas is described. A push button motion is transmitted to an electromagnetic generator for conversion to electrical potential. This apparatus would be independent of any need for external electromotive force for spark ignition.

D. L. Nicol

Space Heating

SPACE HEATING WITH GAS-HEATED AIR. *Gas World* (British) **132,** 116-117 (1950) *December* 16.

A space heater is described that permits the mixing of combustion products with circulating air. This is accomplished by purification of the unburnt gas by an absorption medium within the heater. The sulfur compounds removed are carbon disulfide and oxysulfide to about one grain of sulfur per 100 cu ft. Operating conditions of the absorption medium, which is similar to coke, are temperature 900-950°F and space velocity of 500 volume/volume hour.

D. L. Nicol

Water Heaters

Bartlett, C. E. PERFORMANCE RATING OF AUTOMATIC WATER HEATERS. *Butane-Propane News* **12,** 43-50 (1950) *December.*

The author proposes a new method of rating water heaters by combining the storage rating and the recovery rating. This method shows, more than ever, that hot water heaters are not to be sold on water capacity but heat availability.

D. L. Nicol

Jenkins, G. F. STORAGE TYPE DOMESTIC GAS WATER HEATERS. *Gas World* (British) **132,** 586-587 (1950) *December* 9.

A discussion is presented of the methods of expanding the base load by the gas water heating load in England. Comparison is made of the various types of gas waterheaters as substitutes or auxiliaries to solid fuel boilers.

D. L. Nicol

3. COMBUSTION AND INDUSTRIAL FURNACES

Burners

Ray, W. A. (assigned to General Controls Co.) THERMOCOUPLE FOR GAS OR OIL BURNERS. U.S. 2,535,602 (1950) December 26.

A device that decreases time lag for a thermocouple safety shutoff on gas or oil burners is patented. Both the cold junction and the hot junction are placed in the flame and the temperature differential is decreased to a few hundred degrees Fahrenheit. The time to cool is thus shortened with a resultant decrease in the time lag of the safety shutoff.

D. L. Nicol

Combustion

Chase, S. (assigned to Carnegie-Illinois Steel Corp.) METHOD AND APPARATUS FOR ANALYZING FLUE GAS. U.S. 2,533,430 (1950) December 12.

Objects of this invention are: (1) to provide simple methods and apparatus for controlling the ratio of air to fuels in an effort to obtain substantially complete combustion of liquid, solid, and gaseous fuels charged into combustion chambers, and (2) to continuously analyze the flue gases produced in such operations.

H. Hakewill

Tigges, A. J. (assigned to The Air Preheater Corp.) REMOVAL OF SOLIDS FROM GASES. U.S. 2,537,558 (1951) January 9.

An electrostatic precipitator is described for the removal at an elevated temperature of fines in the combustion products from the combustion of solid or liquid fuels. Advantages claimed are reduction of corrosion by low humidity collection of these fines. It was found that the major corrosion was due to these fines after they absorbed moisture preferentially from a high humidity gas stream.

D. L. Nicol

Submerged Combustion

Moore, W. F. SUBMERGED COMBUSTION. *Coke & Gas* (British) **12**, 317-323 (1950) *September.*

Submerged combustion finds numerous applications for heating and evaporating corrosive fluids, particularly where a high rate of heat transfer is desirable. Various submerged burners have been developed during the last 50 years, as for example the Swindin and Hammond burners which utilize premixed gas in a refractory lined combustion chamber, and the See burner which is a modified direct fired immersion tube. The history of the art is traced from 1887 to present day techniques and a discussion is given on methods of lighting and safety devices.

C. Von Fredersdorff

4. CARBONIZATION AND GASIFICATION

Carbonization

Bengtsson, E. PHENOL AND CRESOLS IN COAL TAR FROM COALS CARBONIZED AT 800° and 900°C. U.S. Bureau of Mines Report of Investigations 4755 (1950) December.

Tars from the BM-AGA carbonization tests at 800° and 900°C of 5 American coals were investigated for their phenol and cresol content. The fractions obtained by extraction and distillation were analyzed by infra red spectrometer, and the phenol and cresol-isomer contents were calculated.

O. P. Brysch

Coal Properties

Bangham, D. H. and Dryden, I. G. C. ACCESSIBLE OXYGEN OF BITUMINOUS COALS. *Fuel* (British) **29**, 291-292 (1950) *December.*

Heat of wetting per unit area of a low-rank coal surface in methanol is of an order of magnitude which indicates merely physical interaction; with a specific coal solvent such as ethylene diamine the heat of wetting is 2-3 times greater. This increased effect is due to additive surface reaction, probably with a specific oxygen grouping in the coal. For coals containing 5 to 10% oxygen heat evolution of at least 25 kcal/gram atom of oxygen occurs with ethylene diamine. For coals above 10% oxygen, the heat of wetting increase for each per cent increase in oxygen content falls to the same rate as with methanol. The mean line for this difference in heats of wetting for freshly oxidized coals shows that oxidation above 10% O_2 causes an increase (exposes new reactive groups), but at a lower rate than does the fresh coal.

O. P. Brysch

Crentz, W. L. and Steele, F. PREPARATION CHARACTERISTICS OF COAL OCCURRING IN CAMBRIA COUNTY, PA. U.S. Bureau of Mines Report of Investigations 4747 (1950) November.

This is the first report of a series on preparation characteristics of coal beds by counties.

Washability studies are given for 14 samples from the 4 principal seams—Upper and Lower Kittanning and Upper and Lower Freeport. Sulfur reduction is possible by fine crushing and mechanical cleaning, especially with the first two coals. Graphical and tabulated data are included. About 50% of current coal production (15,458,000 tons) is mechanically cleaned in 22 plants.

O. P. Brysch

Dryden, I. G. C. BEHAVIOR OF BITUMINOUS COALS TOWARDS SOLVENTS—II. *Fuel* (British) 29, 221-228 (1950) *October.*

This is the second part of a review article. The extraction products from the primary fractionation of benzene and pyridene extracts are described. Coking properties and the chemical nature are treated. Colloidal properties involved in extraction process and results of various physical methods of study are mentioned. In the conclusions, the chemical similarities of extract and residue, the yields, and the controlling importance of the colloidal nature of coal are broadly reviewed. Commercial applications are chiefly in production of low-ash carbon for electrodes, although chemicals of controlled complexity could be a future field. An addendum of work reported to date is included.

O. P. Brysch

Van Krevelen, D. W. GRAPHICAL-STATISTICAL METHOD FOR THE STUDY OF STRUCTURE AND REACTION PROCESSES OF COAL. *Fuel* (British) 29, 269-284 (1950) *December.*

A graphical-statistical method is developed for the study of problems connected with structure and reaction processes of coal. In this method use is made of a diagram in which the atomic hydrogen-to-carbon ratio has been plotted versus the atomic oxygen-to-carbon ratio. This graphical method offers the advantage that the principal reactions such as decarboxylation, demethanation, dehydration, dehydrogenation, hydrogenation and oxidation in the aforementioned diagram can be represented by straight lines. Furthermore, an auxiliary diagram is used where the hydrogen-to-carbon ratio of hydrocarbons has been plotted as a function of the number of carbon atoms per molecule. From a combination of the two diagrams valuable information can be drawn as regards the structure of oxygen containing organic products, e.g., high polymers, such as cellulose. These ideas are applied to the coalification series. The skeleton structure of lignin evolved in the literature proves to be in conformity with the results of the graphical statistical method. The conversion of lignite to bituminous coal is found to be based on a decarboxylation: the conversion from high rank bituminous coal to anthracite is a reaction process in which methane is removed almost exclusively in the transition from low rank to high rank bituminous coal a decarboxylation as well as a demethanation and a dehydration occur. The stoichiometry of the coalification is expresed in formulae. A correlation is made between the coalification of various vegetable components and the rank of coal in which the product formed cannot be distinguished from vitrain. Finally the formation process of fusain is studied in more detail and this leads to the construction of a fusinization band by the side of the coal band (=vitrinization band). The principal reaction processes of coal, namely carbonization, hydroconversion, solvent extraction, hydrogenolysis and oxidation, are investigated by a graphical-statistical method. It proves that both in carbonization and in oxidation with gaseous oxygen all coalification products show a tendency to yield a uniform final product; in the carbonization this product has the composition $(C_8H_2O_{0.16})_x$, in the case of oxidation the composition is $(C_8H_2O_3)_x$. Further carbonization results in a graphitization, while an oxidation beyond the above composition gives a complete conversion to carbon dioxide and water. Thermal decomposition in the presence of water vapor under pressure must be based on a reaction mechanism which is closely related with the coalification. In hydrogenation the character of the final products depends both on the character of the starting material and on the conditions under which the hydrogenation is carried out. In oxidation with nitric acid, two stages can be distinguished: in the first stage hydrogen is removed while oxygen is absorbed, in the second stage both hydrogen and oxygen are absorbed and this in the approximate proportion of 1:1. Solvent extraction of coal shows

that coal is not not a homogeneous macromolecule; there is either a differentiation in molecular size or such a configuration that fargments of a relatively low molecular weight are split off rather easily.

Author's abstract

Coal Reserves

Dowd, J. J., Turnbull, L. A., Toenges, A. L., Cooper, H. M., Abernethy, R. F., Reynolds, D. A. and Crentz, W. L. ESTIMATE OF KNOWN RECOVERABLE RESERVES OF COKING COAL IN INDIANA COUNTY, PA. U.S. Bureau of Mines Report of Investigations 4757 (1950) December.

This is the second report of a series on natural coking coal reserves (see R. I. 4734, October, 1950). Indiana County, in West Central Pennsylvania contains 3 major coal beds: Upper Freeport (E), Lower Freeport (D), Lower Kittanning B, and 5 minor beds. Reserves in all beds over 14 inches thick are estimated at 2,544 million short tons, as of January 1, 1948. Of this total, 1,989 milion tons are in beds over 28 inches thick (recoverable). Weighted average recovery for all beds is 48.95%. The coals generally are strongly coking and principally of medium-and high-volatile A bituminous rank. Area maps, tabulated data on separate beds, bed sections and analyses are included.

O. P. Brysch

Coke Breeze

Siderfin, N. E. THE UTILIZATION OF COKE BREEZE. *Coke & Gas* (British) **12**, 335-337 (1950) *September.*

Investigations are reported on five methods of utilizing coke breeze; namely, (1) upgrading breeze by briquetting with 10% pitch as a binder and carbonizing the briquettes at 1000°C, (2) upgrading breeze by the modulation method which consists of continuously treating coke fines mixed with coal tar in a large rotating cylinder, operating so that sized lumps or nodules are formed, (3) utilization of carbonized breeze briquettes or ovoids in coke boilers and gas producers, (4) use of untreated breeze in gas producers, and (5) briquetting mixtures of breeze, semi-coke and coal without use of added binder. This is accomplished by adding a preheated (500°C) mixture of breeze and semi-coke to a preheated (300°C) stream of suitably graded coking coal, allowing approximately 30 to 90 seconds contact time of the preheated mixtures for plasticity to develop and then briquetting the semi-plastic mixture.

C. Von Fredersdorff

Distillation

Mekler, L. A. (assigned to Institute of Gas Technology) RADIANTLY HEATED ROTARY CARRIER FOR DESTRUCTIVE DISTILLATION. U.S. 2,533,492 (1950) December 12.

A continuous furnace is described for coking heavy oils or tars. It consists of an annular hearth, rotating between concentric walls, all protected by refractory; the oil being sprayed onto the hearth is heated by radiated heat from internally fired metal roof-coils which are periodically cooled and contracted to flake off the carbon deposits from the radiating surface. The annular furnace is divided into sectors in each of which a charge of oil is added on top of any coked layer brought in from the preceding sector by the rotating hearth until a desired coke thickness accumulates. At this point a pusher mechanism, centrally fixed, forces the layer radially outward into a sealed cooling chamber.

O. P. Brysch

Pearson, B. M. GERMANS MAKE PIG IRON WITHOUT COKING COAL. *Iron Age* **167**, 71-72 (1951) *January* 11.

The Humboldt distillation process was developed from L. Weber's war-time work with the Kloeckner-Humboldt-Deutz firm in Germany. Gas and tar-rich non-coking coals are briquetted with iron ore fines and charged continuously with remainder of burden to a 17-foot shaft furnace. Low-temperature carbonization occurs as in the Spuelgas coking processes at the top of the shaft, with full coking, reduction and melting following in order in 1½ to 2 hours as the charge moves downward. Dust, thick tar (for briquetting), and by-products are removed from the 350 Btu gas which also preheats the blast by recuperation. With extra coal, about 3.5 tons pig per cubic meter of

furnace volume was produced from pyrite and bauxite residues with gas coal of 15% ash content, with the 3.1-3.5% carbon, basic gray iron resembling that from other small, "cold-blast" blast furnaces. Production costs are lower than normal blast furnace with the same high-sinter burden. Briquetting replaces the sintering operation, and capital costs are reduced by smaller furnace and blast volumes, and by abolition of coke ovens.

O. P. Brysch

Fluidized Carbonization

Nelson, K. J. and Martin, H. Z. (assigned to Standard Oil Development Co.) FLUIDIZED CARBONIZATION PROCESS. U.S. 2,537,153 (1951) January 9.

In the carbonization of coal or similar material, plugging of the offtake line of the reaction vessel is avoided by maintaining the temperature in the line the same as that in the vessel. This is accomplished either by injecting air into the stream before it enters the offtake line, or by injecting a highly superheated inert gas.

W. J. Merwin

Gasification

Totzek, F. and Osthaus, K. H. THE KOPPERS-TOTZECK PROCESS FOR THE GASIFICATION OF PULVERIZED COAL. *Coke & Gas* (British) **12**, 215-223 (1950) *June*.

Theoretical equations are developed for the extent of carbon gasification as a function of time and particle diameter based on the assumptions that a diffusional process is controlling in the rate expression and that gas composition at the particle surface is in thermodynamic equilibrium.

C. Von Fredersdorff

Grinding of Coke

Mott, R. A. SUPERFINE GRINDING OF COKE AND OTHER MATERIALS. *J. Soc. Chem. Ind.* (British) **69**, 346-349 (1950) *November*.

Dry grinding with steel balls in a porcelain jar mill can reduce coal and coke to 2 microns in 2 and 1 hours respectively, but thereafter the caking of the material on grinding surfaces causes grinding action to cease. Wet grinding, however (liquid/charge ratio of 10/1) disperses the charge and permits grinding of coke to continue down to 30 millimicrons after 50 hours. Coal and coke results are graphed. Effect of corrosion on steel balls is tabulated.

O. P. Brysch

Hydrogen

Etienne, A. (assigned to L'Air Liquide, Societe Anonyme pour l'Etude et L'Exploitation des Procedes Georges Claude) PROCESS FOR SEPARATING BY LIQUEFACTION GASEOUS MIXTURES INTO THEIR CONSTITUENTS. U.S. 2,534,903 (1950) December 19.

The invention is concerned with the separation of gaseous mixtures by partial liquefaction and fractionation. The primary engineering problem is getting enough cooling economically, and the means of accomplishing this are set forth. The preferred application of the process is to the separation of hydrogen from coke oven gas.

J. D. Parent

Manufactured Gas

Stanier, H. and McKean, J. B. TOWN GAS FROM PETROLEUM OIL. *Gas J.* (British) **265**, 111, 112, 117-120 (1951) *January* 10.

This article, extracted from Communication 375 of the Institution of Gas Engineers, also includes the oral discussion following presentation of the paper on November 28, 1950. Catalytic gasification of gas oil and heavy fuel oil has been conducted in laboratory and pilot plant tests. The laboratory development of alkali catalysts indicated gasification of oil in the presence of steam to produce a 500 Btu, 0.44 specific gravity gas. Use of a steam-oil weight ratio of slightly under 1:1 would give about 0.83 therms of gas per gallon and 25-30% of carbon. Pilot plant tests with a catalyst prepared from 34 parts of calcium carbonate, 63 parts of bauxite and 3 parts of bentonite confirmed laboratory indications. The operation was cyclic with about 3 minutes each of blow and make periods separated by 0.5 minutes of steam purging. Use of the process for peak load purposes is indicated.

C. H. Riesz

Thompson, D. M. GAS MANUFACTURE AND USE. *Gas J.* (British) **264**, 422, 425 (1950) *November* 29.

Higher productivity is needed to offset higher costs of capital and labor. Reduction of gas holder storage volume, increased use of coke, improved pressures in distribution systems, and improved appliances in industrial and domestic utilization are discussed briefly.

O. P. Brysch

Purification

Kohl, A. L. SELECTIVE H_2S ABSORPTION. A REVIEW OF AVAILABLE PROCESSES. *Petroleum Processing* **6**, 26-31 (1951) *January.*

Purification processes are described using simplified flow diagrams to illustrate operation cycles employed and chemical equations to illustrate reactions involved. Processes considered include: iron oxide-dry box, Seaboard iron-soda, Thylox, Phenolate, tri-potassium phosphate, and amine systems. It is concluded that each of the various processes has specific applications, and that the iron oxide-dry box, iron-soda, and Thylox processes are particularly well-suited where essentially complete selectivity is required for H_2S removal in the presence of $C0_2$. Where a partially selective process is adequate, the Phenolate, tripotassium phosphate, triethanolamine or methyldiethanolamine systems may be utilized. Laboratory and pilot plant research indicate that methyldiethanolamine offers considerable promise on the basis of its high acid gas capacity, low steam requirement, good selectivity, and extremely high H_2S removal efficiency.

H. Hakewill

Thompson, R. J. ARTIFICIAL OXIDES FOR GAS PURIFICATION. *Gas World* (British) **132**, 563-564 (1950) *December* 2.

The author reviews the sources and compositions of various forms of oxide (other than bog ore) employed for gas purification and gives some indication of their usefulness.

H. Hakewill

Smokeless Fuel

Phillips, D. T. MANUFACTURE OF SMOKELESS FUEL. *Gas J.* (British) **265**, 57, 58, 63 (1950) *January* 3.

The preparation of smokeless fuel from the fine sizes of semi-anthracite coal is described. The coal is mixed with pitch (6 to 10%), blended, and briquetted by press rolls. Carbonization in continuous vertical retorts at medium temperature produces a hard, uniformly sized fuel of about 5% volatile matter. Iron oxide is added to the coal-pitch mixture to enhance the combustion properties by fluxing the ash.

W. E. Ball

Water Gas

A CONTINUOUS WATER-GAS PROCESS. *Coke & Gas* (British) **12**, 312, 313, 316 (1950) *September.*

A standby water gas process utilizing off-peak electrical power is suggested for the continuous gasification of pulverized coke. The method comprises (a) preparation of coke fines as, for example, from coke breeze, (b) dropping the pulverized coke downward through a vertical reactor, (c) introducing superheated steam countercurrently to the descending cloud of coke breeze, and (d) supplying process heat by radiant electrical elements located in the vertical reactor. A possible advantage of the process lies in the high rate of heat transfer from the radiant heaters to the coke particles.

C. Von Fredersdorff

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Belcher, R. AN ABSORPTIOMETRIC METHOD FOR THE DETERMINATION OF PHOSPHORUS IN COAL AND COKE ASH. p. 29

Cook, M. G. PEAK SHAVING AT LINCOLN, NEBRASKA. p. 25

Reed, R. M., Updegraff, N. R. and Parker, J. L. PROCESSES FOR REMOVAL OF HYDROGEN SULFIDE FROM INDUSTRIAL GASES, p. 24

Taft, C. D. LATEST METHOD OF LEAKAGE CONTROL IN DISTRIBUTION. p. 24

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Carbon Black

Swaminathan, V. S. BRITAIN GETS "SOOTLESS" CARBON-BLACK PLANT. *Oil Gas J.* **49**, 75, 76, 89 (1951) *January* 11.

Cabot Carbon Company is operating a carbon black plant which is said to be sootless. The exhaust gas from the precipitators and cyclones is further treated in a wet scrubber and precipitator.

J. D. Parent

Distribution

Taft, C. D. LATEST METHOD OF LEAKAGE CONTROL IN DISTRIBUTION. *Gas Age* **106**, 50, 78, 80 (1950) *December* 7.

The following recommendations are made as a logical program for leakage control of a distribution system: (1) use up-to-date methods of protection in all new construction work; (2) odorize the gas; (3) use combustible gas indicators for leak detection; (4) install leak clamps on bell and spigot joints where leaking joints are creating a hazard; (5) instruct men to watch for vegetation deterioration; (6) make systematic surveys of congested business areas and public buildings with combustible gas indicators.

O. T. Bloomer

Hydrogen Sulfide Removal

Reed, R. M., Updegraff, N. C. and Parker, J. L. PROCESSES FOR REMOVAL OF HYDROGEN SULFIDE FROM INDUSTRIAL GASES. *Oil Gas J.* **49**, 48, 51, 52, 58 (1951) *January* 4.

Various well-known processes used for H_2S removal are briefly described and illustrated by means of flow diagrams. The iron oxide process is the only dry removal method mentioned. Wet methods are classed as nonregenerative processes, in which the reagent employed reacts with H_2S to remove it from the gas stream and the reaction product is periodically discarded, and regenerative processes, in which the reagent employed reacts with H_2S to remove it from the gas stream and the reaction product is treated for reagent recovery. Nonregenerative processes discussed include the use of caustic soda solution, lime slurries, potassium permanganate solution, and sodium bichromate-zinc sulfate solution. Regenerative processes discussed include Koppers Seaboard, Girbotol, Shell Phosphate, Thylox, Alkazid and Phenolate. Selectivity of processes for H_2S removal in the presence of CO_2 is also discussed. Control of foaming, corrosion, and loss of monoethanolamine in Girbotol operations is described.

H. Hakewill

Methane Liquefaction

Rupp, W. H. LIQUEFACTION OF METHANE. U.S. 2,529,312 (1950) November 7.

This invention relates to the liquefaction of natural gas or similar gases, particularly methane. It is proposed that an improvement on the prior art results from use of absorption oil to eliminate some of the gas compression. This step is also designed to separate nitrogen. Compressed gas at about 200 psi is to be contacted with absorption oil which enters the absorber at −130°F. Rich oil is compressed to about 600 psi, heated, and sent to a stripper where bottoms are maintained by a reboiler at 400°F. Gas from the stripper is cooled to secure liquefaction by use of cascade refrigeration as is done in the prior art.

J. D. Parent

Abstractor's Note: This process is said to be capable of treating wet gas, but the reviewer feels that hydrate trouble is almost certain to develop at the temperature employed in the absorber unless the gas is first intensively dried. The process is said to be economical, but refrigeration is very costly and extensive cooling of lean oil from the stripper is required.

Natural Gasoline

Fulton, W. F. PLATFORMING NATURAL GASOLINE—ITS POTENTIALITIES FOR THE INDUSTRY. *Petroleum Refiner* **29**, 109-112 (1950) *December*.

Application of "platforming" to natural gasoline products is considered. A brief study of

the chemistry of the process demonstrates that only the hexanes and heavier fraction can be effectively improved. This fraction constitutes 39% of 26-pound natural gasoline and platforming will produce a high-octane product containing 60% isoparaffins and 40% aromatics. However, an excess of butanes and pentanes will remain. Exclusive of fractionating equipment, a plant processing 1500 bbl/day of feed costs $700,000 while for 5000 bbl/day, the cost is $1.6 million. It is concluded that platforming is economical if sufficient hexanes plus are available. Need for a low-cost method for converting butanes to motor fuel type hydrocarbon products is indicated.

C. H. Riesz

Gregory, L. S. "PACKAGED" GASOLINE PLANT IS COMPLETELY PORTABLE. *Oil Gas J.* **49**, 60-62, 72 (1950) *November* 30.

A description with flow diagram is given of a skid mounted "packaged" gasoline plant. Low first cost, low operating cost, reasonable gasoline recovery, and reasonable LPG recovery (if desired) are features of the plant. The plant described processes 600 to 700 Mcf of gas per day. The plant employs a cold oil circuit which requires no external source of heat. Lean gas is used to strip the rich oil. This gas is recompressed and cooled. The condensate then produced is stabilized in a fractionator and the gas is recycled to the absorber. If LPG recovery is desired a second column may be added. Plant economics are briefly discussed. It is stated that this type of plant is more economical than a standard plant up to a capacity of about 4,000 Mcf per day. The labor requirement is one man-hour per day.

O. T. Bloomer

GASOLINE PLANT'S STORAGE HOLDS OVER 140 DAYS' LPG PRODUCTION. *Petroleum Processing* **5**, 1307 (1950) *December.*

The world's largest reported storage installation for propane and butane is at Plymouth Oil Company's new gasoline plant in the Benedum field, Texas. 56 propane tanks have a capacity of over three and one half million gallons, while 30 butane have a capacity of nearly two million gallons. This enables the company to store 140 days' production and to hold its supplies for favorable prices. Tanks are supported by two cradles, with the rear cradle resting on rollers to allow expansion or contraction.

J. D. Parent

NATURAL GASOLINE: TODAY'S EQUIPMENT IS TAILORED TO GASOLINE PLANT'S NEEDS. *Petroleum Processing* **5**, 1320-1324 (1950) *December.*

Recent progress in natural gasoline plant equipment is reviewed. Some topics treated are: pumps, cooling towers, refrigeration and perforated plate towers.

J. D. Parent

Nitrogen Removal

Mullins, P. V. REMOVAL OF NITROGEN FROM NATURAL GAS. *Petroleum Engr.* **23D**, 36-37 (1951) *January.*

The exploratory work done by the U.S. Bureau of Mines for the American Gas Association on the removal of nitrogen from natural gas is reviewed briefly. Some pilot plant tests on fractionation of liquefied natural gas were carried out, but the data are not yet available.

J. D. Parent

Peak Shaving

Cook, M. G. PEAK SHAVING AT LINCOLN, NEBRASKA. *Gas Age* **106**, 38, 39 (1950) *December* 7.

A brief description is given of a 5 MMcf/day propane air peak shaving plant recently installed at Lincoln, Nebraska. In order to minimize the effect on the distribution system, and for ease in operation, the plant was located several miles out of town on the main line to the city. Compressed air is supplied by 4 portable diesel engine-driven compressors and steam to the vaporizers is supplied by a packaged steam boiler.

O. T. Bloomer

Pipe Lines

Alfred, J. K. INTERNAL PIPE COATING TECHNIQUES. *Petroleum Engr.* **23D**, 26, 28-34 (1951) *January; Pipe Line News* **22**, 22-25 (1950) *December; World Oil* **132**, 181-184, 186, 190 (1951) *January.*

The high concentration of H_2S in certain crude oils presents a major problem in the internal corrosion of the pipe lines. A coating which will last at least two years is believed profitable. Three methods of combatting this internal corrosion by protective internal coatings are: (1) plastic lining applied in place, (2) cement lining applied at factory, and (3) cement lining applied in place. The procedures for the application of these linings and the various economic factors involved are discussed.

B. E. Hunt

Production

Borden, G., Jr. and Rzasa, M. J. CORRELATION OF BOTTOM HOLE SAMPLE DATA. T.P. 2931. *Petroleum Trans. A.I.M.E.* **189**, 345 348 (1950) in *J. Petroleum Technol.* 2 (1950) *December.*

Correlations are presented which enable one to decide if a reservoir fluid is saturated or unsaturated. Data required are gas-oil rates, reservoir temperature, residual oil specific gravity and specific gravity of the pentanes and lighter fractions.

J. D. Parent

Greco, E. C. 2,4-D ERADICATES WATER HYACINTH. *Oil Gas J.* **49**, 85 (1950) *January* 11.

United Gas Pipe Line Co. owns and operates 32 miles (183 acres) of canals in the marsh lands of Louisiana. The canals provide links to company properties where there are no roads. The waterways tend to be choked by water hyacinth. The company has found that 2,4-D eliminates this difficulty.

J. D. Parent

Latter, F. CORROSION CONTROL IN WATER-FLOODING. *World Oil* **132**, 141-142, 144 (1950) *January.*

Tests are reported which indicate that a mixture of quaternary ammonium salt, a condensed ethylene oxide-fatty acid wetting agent and sodium nitrite has proved highly effective in combatting corrosion in water flooding operations, in controlling micro-biological growths, and gives indications of increasing intake rates. The mixture is compatible with brines and further tests are being undertaken to determine its value as a corrosion inhibitor for brines and produced waters used for flooding purposes.

B. E. Hunt

Showalter, W. E. MOUNTING CORE ANALYSIS SPECIMENS IN THERMOPLASTIC. *J. Petroleum Technol.* 2, 8-9 (1950) *December.*

An improved procedure for mounting core specimens in thermoplastics is described. The shaped specimen is fitted into a machined plastic (lucite) container. Machined plastic caps are cemented on each end and the assembly is placed in a steam jacketed pressure vessel. A pressure of 500 psig and a temperature of 250°F are maintained for four hours. The plastic is bonded firmly to the core and penetration of the plastic is only about one-half grain diameter. This procedure is stated to be more convenient than the usual procedure of casting plastics about the sample.

O. T. Bloomer

Trube, A. S., Jr. and DeWitt, S. N. HIGH PRESSURE WATER INJECTION FOR MAINTAINING RESERVOIR PRESSURES, NEW HOPE FIELD, FRANKLIN COUNTY, TEXAS. T.P. 2939. *Petroleum Trans. A.I.M.E.* **189**, 325-334 (1950) in *J. Petroleum Technol.* 2 (1950) *November.*

Pressure maintenance operations in the New Hope Field are discussed. Water is injected at depth of 7300 to 8000 ft with intake well-head pressure up to 4000 psi. Records of oil and water production, water injected and gas oil ratio are kept and pressures are taken at regular intervals. Estimates based on break through patterns indicate that substantial secondary recovery will be accomplished. Reduced lifting costs have also resulted.

O. T. Bloomer

ENGINEERING FUNDAMENTALS: GAS AND WATER CONING. *Oil Gas J.* **49**, 87 (1950) *December* 28.

The mechanism of coning of gas or water into a producing oil well is briefly described. Methods of aleviating coning are briefly discussed.

O. T. Bloomer

Storage

Lee, M. W. LIQUEFIED GAS STORAGE SYSTEM. U.S. 2,535,364 (1950) December 26. When a liquid is vaporized it must absorb considerable latent heat. This invention is concerned with the use of this heat quantity for refrigeration where large quantities of LPG are vaporized from storage tanks.

J. D. Parent

Martin, H. A., Young, A. R. and Nelly, H. M., Jr. (assigned to J. F. Pritchard & Co.) METHOD OF STORING NATURAL GAS. U.S. 2,535,148 (1950) December 26.

This invention is concerned with storage of natural gas in solution at low temperature during periods of low demand and regasifying at peak times. The temperature would be higher than normal liquefaction temperatures, and the absorbent would be a hydrocarbon, normally gaseous.

J. D. Parent

Sulfur Production

Webb, M. PRODUCTION OF SULFUR FROM HYDROGEN SULFIDE AT ELK BASIN, WYOMING, REPRESSURE PLANT. *Oil Gas J.* 49, 71-72 (1951) *January* 11.

Hydrogen sulfide is recovered from the acid gas recovered and discharged by the Girbotol process. A modified Claus process is used to prepare elemental sulfur. 80 tons per day of 99.5% purity can be produced. A flow sheet and operating data are given.

J. D. Parent

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Kohl, A. L. SELECTIVE H_2S ABSORPTION. A REVIEW OF AVAILABLE PROCESSES. p. 23

Thompson, R. J. ARTIFICIAL OXIDES FOR GAS PURIFICATION. p. 23

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalyst

Pierce, J. A. (assigned to Standard Oil Development Co.) MAGNETITE CONTAINING CATALYST FOR THE SYNTHESIS OF HYDROCARBONS. U.S. 2,537,699 (1951) January 9.

An iron catalyst for the synthesis of hydrocarbons from carbon monoxide and hydrogen is prepared by reacting powdered aluminum with about twice its stoichiometric weight of iron oxide at elevated temperatures. A suitable mixture comprises 13 weight-% aluminum and 87 weight-% Fe_2O_3. Alkali metal promoters may be added.

C. H. Riesz

Safford, R. V. (assigned to Stanolind Oil and Gas Co.) CONDITIONING IRON CATALYST. U.S. 2,533,694 (1950) December 12.

In the reduction of alkalized iron catalyst suspended as fluidized bed, a tendency to defluidize is attributed to a migration of free caustic to the surface of the particles. It is claimed that this can be avoided by lowering the reduction temperature at least 5°F and preferably 50°F below the defluidization temperature.

C. H. Riesz

Fischer Tropsch Synthesis

Atwell, H. V. (assigned to The Texas Co.) SYNTHESIS OF HYDROCARBONS. U.S. 2,534,395 (1950) December 19.

The synthesis of hydrocarbons from carbon monoxide and hydrogen is conducted in the presence of both an iron catalyst and a polymerizing catalyst. The use of "solid" phosphoric acid as specified polymerized the propylene-butylene components and increased the gasoline yield by about 30% over that found in the presence of only the iron catalyst.

C. H. Riesz

Hall, W. K., Tarn, W. H. and Anderson, R. B. STUDIES OF THE FISCHER-TROPSCH SYNTHESIS. VII. SURFACE AREA AND PORE VOLUME STUDIES OF IRON CATALYSTS. *J. Am. Chem. Soc.* **72**, 5436-5443 (1950) *December.*

The changes in surface area and pore volume upon reduction have been studied for two widely different iron hydrocarbon synthesis catalysts. The surface areas of raw precipitated Fe_2O_3-CuO-K_2CO_3 catalysts are high and their pore diameters are small. Fused Fe_3O_4-MgO-K_2O catalysts have essentially no surface area or pore volume. After reduction both have surface areas of about 8 sq meters per gram and reasonably large pore diameters, 350 to 900 Angstroms. Studies of iron catalysts of the synthetic ammonia type showed that surface area and pore volume increased linearly with extent of reduction but that average pore diameter remained constant for 842°F temperature of reduction; increase of reduction temperature from 842 to 1202°F provided an eightfold increase in pore diameter.

C. H. Riesz

Mosesman, M. A. (assigned to Standard Oil Development Co.) METHOD FOR SYNTHESIZING HYDROCARBONS AND OXYGENATED COMPOUNDS. U.S. 2,537,688 (1951) January 9.

Synthesis of hydrocarbons and oxygenated compounds from carbon monoxide and hydrogen is effected through use of a catalyst comprising reduced iron oxide and alkali metal ferrate. As an example, a catalyst prepared by reducing 100 parts by weight of ferro-ferric oxide and 5 parts by weight of potassium ferrate gave high yields of hydrocarbons for over 1500 hours.

C. H. Riesz

Reichl, E. H. PROCESS FOR THE MANUFACTURE OF SYNTHESIS GASES. U. S. 2,529,630 (1950) November 14.

Synthesis gas comprising a mixture of carbon monoxide and hydrogen is prepared stage-wise by first contacting steam, carbon dioxide and methane at temperatures of about 1200-1500°F in the presence of a reforming catalyst. Only 10-45% of the methane is reacted, producing a hot gas mixture to which is added oxygen and additional methane. Next, exothermic reaction at temperatures of 1900-2600°F is conducted to effect substantially complete conversion of the methane. The heat contained in these products is transferred by indirect contact to supply the endothermic heat required in the first stage.

C. H. Riesz

Watson, C. W. (assigned to The Texas Co.) SYNTHESIS OF HYDROCARBONS. . U.S. 2,537,496 (1951) January 9.

In the synthesis of hydrocarbons from carbon monoxide and hydrogen, iron is carbided in a first stage at temperatures of 335 to 370°F. The synthesis gas issuing from this step is substantially free of carbon monoxide and is used to reduce the carbided iron to form hydrocarbons at higher temperatures, e.g., 475-625°F.

C. H. Riesz

Oil Shale

Dancy, T. E. and Giedroyc, V. FURTHER INVESTIGATION OF THE CHEMICAL CONSTITUTION OF THE KEROGEN OF OIL SHALES. *J. Inst. Petroleum* (British) **36**, 607-623 (1950) *October.*

The constitution of kerogen obtained from three different oil shales was studied by gaseous oxygen, hydrogen peroxide and alkaline permanganate oxidation methods.

C. H. Riesz

Sweetening

Kalichevsky, V. A. SWEETENING AND DESULFURIZATION OF LIGHT PETROLEUM PRODUCTS. PART III. SODIUM PLUMBITE TREATMENT. *Petroleum Refiner* **30**, 129-135 (1951) *January.*

Conversion of mercaptans in light petroleum distillates to disulfides by doctor sweetening is reviewed. The process consisting in agitating sodium plumbite solution with oil in the presence of elemental sulfur is surveyed. There are 140 references, mainly patents.

C. H. Riesz

7. ANALYTICAL METHODS AND TESTS

Carbon Dioxide in Coal

Thomas, W. C. and Wilkinson, H. C. THE DETERMINATION OF CARBON DIOXIDE IN COAL. *J. Soc. Chem. Ind.* (British) **69**, 306-309 (1950) *October.*

The amount of carbon dioxide in a coal is determined by measuring the pressure developed in an apparatus of constant volume, by heating 5g of 72 BS mesh coal with 10 ml of 5N HCl for 3 minutes in a 100 ml reaction flask connected to a manometer. The apparatus is evacuated to 40 cm Hg prior to spilling the acid from a separate vessel placed in the reaction flask. The apparatus is calibrated with pure anyhdrous sodium carbonate. The pressure of CO_2 must be corrected for its solubility in HCl solution. The test requires 15 minutes.

O. P. Brysch

Carbon Oxides Mixtures

Toensing, C. H. and McKinney, D. S. CARBON MONOXIDE AND CARBON DIOXIDE GASEOUS MIXTURES. *Anal Chem.* **22**, 1524-1526 (1950) *December.*

The methods available for the analysis of gaseous mixtures containing large percentages of carbon monoxide and the balance carbon dioxide are inadequate for accurate determinations. A simple gravimetric procedure was developed using a 500-cc sample of dry gas to increase the analytical accuracy. The carbon dioxide in the gas sample was absorbed by Ascarite and the carbon monoxide was oxidized by copper oxide and also absorbed. Oxygen gas was used to flush the gas sample through the analytical train and to reoxidize the copper oxide. A precision of $\pm$ 0.05% was obtained for a series of 200 analyses of gaseous mixtures containing 75.0 to 99.5% carbon monoxide. The sources of errors are few by this method. No originality is claimed, as many investigators have reported similar procedures.

Authors' abstract

Mass Spectrometer

Honig, R. E. DETERMINATION OF IMPURITY TRACES. *Anal. Chem.* **22**, 1474-1476 (1950) *December.*

A mass spectrometric method for the determination of impurity traces is described which utilizes ionizing energies in the ionization and appearance potential range. This method is applicable to cases where the main compound masks the pattern of the impurity.

D. V. Kniebes

Particle Size Measurement

Bourne, H. G., Jr. and Fosdick, L. B. COLLECTION OF MIST AND DUST FOR PARTICLE SIZE MEASUREMENT. *Anal. Chem.* **22**, 1563-1565 (1950) *December.*

A method of collecting air-borne particulate matter by an electrostatic precipitator upon a bright-line hemacytometer is described. Advantages of method are: density of deposits may be controlled; solution of dust and mist is avoided; and particles are precipitated in their original state.

D. L. Nicol

Phosphorus in Coal

Belcher, R. AN ABSORPTIOMETRIC METHOD FOR THE DETERMINATION OF PHOSPHORUS IN COAL AND COKE ASH. *Fuel* (British) **29**, 232-235 (1950) *October.*

A method that required less than 2 hours time was developed for determining phosphorus in coal and coke ash. Extraction of phosphorus from the ash was accomplished by digestion with a nitric-hydrofluoric acid mixture; and the phosphorus determined by reacting with ammonium molybdate to form molybdenum blue, which was measured in terms of color intensity in a Spekker absorptiometer. The 50 mg sample of ash needed for the determination was small enough that it can normally be obtained from the residue remaining after determining the ash content of a coal or coke, which eliminates the usual necessity for incinerating large quantities of coal or coke to obtain sufficient ash for analysis.

H. Hakewill

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bengtsson, E. PHENOL AND CRESOLS IN COAL TAR FROM COALS CARBONIZED AT 800° AND 900°C. p. 19

Chase, S. METHOD AND APPARATUS FOR ANALYZING FLUE GAS. p. 19

Dancy, T. E. and Giedroyc, V. FURTHER INVESTIGATION OF THE CHEMICAL CONSTITUTION OF THE KEROGEN OF OIL SHALES. p. 28

8. GENERAL AND PHYSICAL CHEMISTRY

Adsorption

Halsey, G. D., Jr. THE RATE OF ADSORPTION ON A NONUNIFORM SURFACE. *J. Phys. & Colloid Chem.* **55**, 21-26 (1951) *January.*

The role of heterogeneity in determining the rate of adsorption is discussed. It is indicated that contact catalysts possess continuously nonuniform surfaces.

C. H. Riesz

B.E.T. Theory

McMillan, W. G. and Teller, E. THE ASSUMPTIONS OF THE B.E.T. THEORY. *J. Phys. & Colloid Chem.* **55**, 17-20 (1951) *January.*

A semi-quantitative discussion is given, showing some of the limitations of the simplified B.E.T. theory as applied to multilayer adsorption. A modified isotherm equation is derived, which takes account of both the effect of the surface energy of the adsorbate, and of the extension of the attractive forces of the adsorbent beyond the first layer.

Burning Velocities

Ashforth, G. K. DETERMINATION OF BURNING VELOCITIES. II. ERRORS INVOLVED IN THE USE OF THE OUTER EDGE OF THE LUMINOUS CONE. *Fuel* (British) **29**, 284-287 (1950) *December.*

The flame-cone angle method of measuring burning velocities is discussed with special reference to experimental work on benzene-air mixtures. It is concluded that a constant burning velocity exists over most of the flame cone. The possibilities of erroneous interpretation of data are discussed.

S. Katz

Combustion Charts

Turner, L. R. and Bogart, D. CONSTANT-PRESSURE COMBUSTION CHARTS INCLUDING EFFECTS OF DILUENT ADDITION. National Advisory Committee for Aeronautics Report 937 (1949)

Charts are presented for the calculation of (a) the final temperatures and the temperature changes involved in constant-pressure combustion processes of air and in products of combustion of air and hydrocarbon fuels, and (b) the quantity of hydrocarbon fuel required in order to attain a specified combustion temperature when water, alcohol, water-alcohol mixtures, liquid ammonia, liquid carbon dioxide, liquid nitrogen, liquid oxygen, or their mixtures are added to air as diluents or refrigerants. The ideal combustion process and combustion with incomplete heat release from the primary fuel and from combustible diluents are considered. The effect of preheating the mixture of air and diluents and the effect of an initial water-vapor content in the combustion air on the required fuel quantity are also included. The charts are applicable only to processes in which the final mixture is leaner than stoichiometric and at temperatures where dissociation is unimportant. A chart is also included to permit the calculation of the stoichiometric ratio of hydrocarbon fuel to air with diluent addition. The use of the charts is illustrated by numerical examples.

Authors' abstract

Corrosion

Mayne, J. E. O., Menter, J. W. and Pryor, M. J. THE MECHANISM OF INHIBITION OF THE CORROSION OF IRON BY SODIUM HYDROXIDE SOLUTION. *J. Chem. Soc.* (London) **1950**, 3229-3236 (November).

When iron, freed from its original air-formed oxide film, is immersed in 0.1N-sodium hydroxide, containing dissolved oxygen, it be-

comes covered with a thin film of $\gamma - Fe_2O_3$; the view is put forward that this film is responsible for passivity and results from a heterogeneous reaction between oxygen, dissolved in the solution, and the iron. A de-aerated solution of 0.1N-sodium hydroxide attacks iron very slowly; the reaction is controlled mainly by high polarization of the cathodic discharge of hydrogen ions.

Authors' abstract

Explosion Limits

Kennedy, R. E., Spolan, I., Mock, W. K. and Scott, G. S. EFFECT of HIGH PRESSURES ON THE EXPLOSIBILITY OF MIXTURES OF ETHANE, AIR, AND CARBON DIOXIDE AND OF ETHANE, AIR AND NITROGEN. U.S. Bureau of Mines Report of Investigations 4751 (1950) *November.*

Studies of the explosion limits (explosibility) of gases at elevated pressures have been extended to include ethane-air, ethane-carbon dioxide-air and ethane-nitrogen-air systems. The investigations were extended to 1,000 psig in the first case and 900 psig in the other two. Increased pressure has little effect on the lower limit, but raises the upper limit very greatly. The ethane-air limits are, for example 2.85% and 12.25% ethane at O psig and 2.40% and 45.80% at 900 psig.

S. Katz

Microeffusiometry

Harris, F. E. and Nash, L. K. MICROEFFUSIOMETRY OF GASEOUS MIXTURES. *Anal. Chem.* 22, 1552-1556 (1950) *December.*

Normally, the analysis of gaseous mixtures by effusion methods is highly unreliable, due to the tendency of the component gases to separate during effusion. It is shown that the application of Graham's Law to each separate component of a mixture may be used to yield a series of equations defining the system in terms of the mole fraction of each component. A simple experimental procedure is described, and experimental data on 2, 3 and 4-component systems is given.

S. Katz

Thermochemistry

Kobe, K. A. and Pennington, R. E. THERMOCHEMISTRY FOR THE PETROCHEMICAL INDUSTRY. *Petroleum Refiner* 29, 93-96 (1950) *December.*

The fourteenth in the series of articles on the thermochemical properties of various compounds of interest to the petroleum industry is concerned with cyclopropane, isopentane, neopentane and the three isomers of xylenes. As previously, tables of reference sources on reliable heat capacities, free energies and heats of formation, molar heat capacities and molar enthalpies on four different temperature scales, the mean molar heat capacities on two different temperature scales, and the coefficients for the cubical heat capacities equation are presented.

S. Mori

10. CHEMICAL ENGINEERING

Fluidized Systems

Leva, M. ELUTRIATION OF FINES FROM FLUIDIZED SYSTEMS. *Chem. Eng. Progress* 47, 39-45 (1951) *January.*

A study was made of the elutriation of fine particles of a given size from coarse particles of a given size. The rates of elutriation were expressed by an equation similar to that governing first order chemical reactions, and rate constants were calculated. The elutriation velocity constants were found to be affected by the gas velocity, particle diameter, fines concentration, particle density and bed height. An analogy was made between a system of fluidized solids and solutions, and it appeared that concentration conditions in dense phase and dilute phase fluidized systems could be related by a modified form of Henry's law.

W. J. Merwin

Gas Purifying Apparatus

Crawford, D. B. (assigned to Elliott Co.) GAS PURIFYING APPARATUS. U.S. 2,535,351 (1950) *December* 26.

This invention is concerned with the removal of condensible impurities in a gas being cooled. Specifically, the moisture, CO_2 and acetylene

of air can be removed while being cooled intensively prior to liquefaction. A special heat exchanger containing a rotating element and means of removing impurities are described.

J. D. Parent

Pressure Drop Calculations

Kershaw, C. A. SIMPLIFIED DIRECT METHOD OF PRESSURE DROP CALCULATIONS FOR VISCOUS FLUIDS. *Power Eng.* 55, 78-80, 102, 104, 106 (1951) *January.*

The Simplified Direct Method of pressure drop calculation is based on operating units instead of absolute units in transposed versions of the Fanning and Poiseuille equations. The Simplified Direct equations appear at the end of this discussion with graphic and tabular data to enable quick and easy solution of flow problems with viscous fluids. Specifically, this discussion includes: 1. a statement of background, necessity and basis for development, 2. explanation and description of the method, 3. general problem types, 4. examples, 5. a section on speedy manipulation of equations, 6. a sample exercise problem, and 7. footnotes and references.

Author's abstract

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Harris, F. E. and Nash, L. K. MICROEFFUSIOMETRY OF GASEOUS MIXTURES. p. 31

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Automatic Control

Clarridge, R. E. A NEW CONCEPT OF AUTOMATIC CONTROL. *Instruments* 23, 1248-1251, 1290-1292 (1950) *December.*

The author outlines an improved control system which incorporates three control effects in such a way that automatic reset can be used and overpeaking on start-up may still be avoided. This is to be done by dividing a controller into two sections, the first section incorporating proportional and derivative responses and the second incorporating proportional and automatic reset responses. Diagrams and discussion are presented. This system is said to have its greatest utility on batch and semi-continuous operations where start-up may occupy the greatest portion of the processing time.

W. J. Merwin

13. NEW BOOKS

Gas Producers

Gumz, W. GAS PRODUCERS AND BLAST FURNACES. New York, John Wiley & Sons, Inc., 1950.

Starting with a definition of the fundamental chemical reactions occuring in gas producers, the author utilizes the thermodynamic equilibrium constant and material balance to derive general equations for the equilibrium gas composition and for estimating gas compositions at incomplete equilibrium. The triangle method and Newton's approximation method are used to advantage in calculating non-equilibrium cases and several basic examples are given. The performance of gas producers is evaluated from the heat balance and other calculations based on the gas analysis. In the mathematical treatment of gas producer operation, several important aspects such as moisture content of the gasifying agent, blast preheat, recycling off-gas, concurrent and down-draft gasification, effect of pressure, slagging operation, and gasification of oxygen-enriched air are considered. Blast furnace operation is treated stoichiometrically, using a minimum of thermodynamics to calculate the results obtained from blast furnace reactions. Included among examples of computation are results for the charcoal blast furnace, pressure operation of blast furnaces and performance with oxygen-enriched air blast. A brief consideration is given to kinetics of mass transfer and chemical reaction with the inclusion of some experimental results on carbon combustion in air, and carbon gasification rates in gas producers. In the opinion of the reviewer, this treatment of gas producers and blast furnaces is very clearly written and requires only a minimum knowledge of advanced mathematics for ready understanding.

C. Von Fredersdorff

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